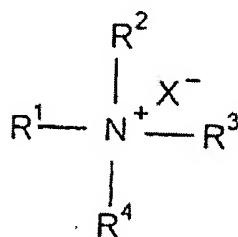


CLM PTO 04/15/02

1. (amended) An aqueous based fluid in oil field applications comprising:

a) at least one cationic surfactant having the following general structure:



wherein R<sup>1</sup> is alkyl amine alkylene or alkyl amido alkylene; R<sup>2</sup> and R<sup>3</sup> are each alkyl, hydroxy alkyl, polyalkoxy with the degree of polymerization ranging from 2 to 30, hydroxyl alkyl sulfonate, alkyl sulfonate or alkylarylsulfonate; R<sup>4</sup> is hydrocarbon, saturated or unsaturated; wherein any two of R<sup>2</sup>, R<sup>3</sup> and R<sup>4</sup>, together with the nitrogen atom to which they are attached, form a heterocyclic ring; and X is selected from the group consisting of halides; oxo ions of phosphorous, sulfur or chloride; and organic anions; and, optionally

b) at least one counterion selected from the group consisting of inorganic salts, organic salts, organic acids, alcohols, and mixtures thereof.

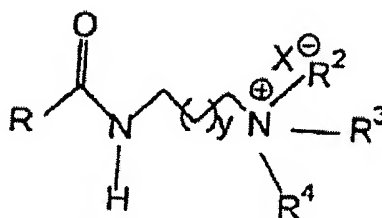
2. The aqueous based fluid of Claim 1 wherein said fluid comprises at least one counterion selected from the group consisting of sulfates, sulfonates and salicylates.

3. The aqueous based fluid of Claim 1 wherein said counterion comprises at least one aromatic group.

4. The aqueous based fluid of Claim 1 wherein X is an aromatic sulfonate.

5. (amended) The aqueous based fluid of claim 1 wherein said counterion is an aromatic sulfonate.

~~6~~ 7. The aqueous based fluid of Claim 1 wherein said cationic surfactant has the following general structure:

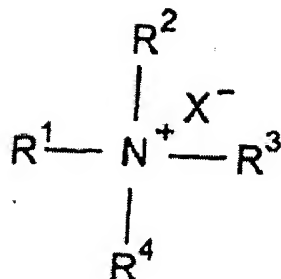


wherein R is saturated or unsaturated alkyl and y is an integer from 1 to 12.  
~~7~~ 8. The aqueous based fluid of Claim ~~7~~ 6 wherein R has from about 6 to about 26 carbon atoms.

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- ~~8~~ 9. The aqueous based fluid of Claim ~~7~~<sup>9</sup> wherein R has from about 12 to about 22 carbon atoms.
- ~~9~~ 10. The aqueous based fluid of Claim ~~7~~<sup>6</sup> wherein R is erucyl.
- ~~10~~ 11. The aqueous based fluid of Claim ~~6~~<sup>6</sup> wherein y is 1.
- ~~11~~ 12. The aqueous based fluid of Claim 1 wherein said cationic surfactant is isostearylamidopropylmorpholine.
- ~~12~~ 13. The aqueous based fluid of Claim 1 wherein said surfactant is present in said fluid at a concentration of about 0.05% to about 10% by weight of said fluid.
- ~~13~~ 14. The aqueous based fluid of Claim 1 wherein said fluid has thermal stability of greater than about 85° C.
- ~~14~~ 15. The aqueous based fluid of Claim 1 in combination with a high brine liquid comprising from about 30 wt-% to about 70 wt-% salt.
- ~~15~~ 16. A method of fracturing a subterranean formation comprising the steps of:
- I) providing a thickened aqueous based hydraulic fracturing fluid, comprising:
    - a) an aqueous medium; and
    - b) an effective amount of at least one gelling agent having the following general structure:

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wherein  $R^1$  is alkylamine alkene or alkyl amidoalkene,  $R^2$  and  $R^3$  are each alkyl, hydroxy alkyl, alkyl, hydroxy alkyl, polyalkoxy with the degree of polymerization ranging from 2 to 30, hydroxyl alkyl sulfonate, alkyl sulfonate or alkylarylsulfonate;  $R^4$  is hydrocarbon, saturated or unsaturated; or wherein any two of  $R^2$ ,  $R^3$  and  $R^4$ , together with the nitrogen atom to which they are attached, form a heterocyclic ring; and  $X$  is selected from the group consisting of halides; oxo ions of phosphorous, sulfur or chloride; and organic anions; and

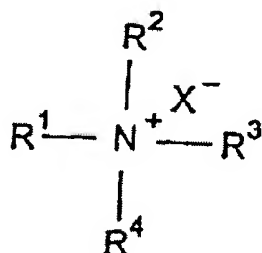
- c) at least one counterion selected from the group consisting of organic salts, inorganic salts, organic acids, alcohols, and mixtures thereof; and
- II. pumping the aqueous fracturing fluid through a wellbore and into a subterranean formation at a pressure sufficient to fracture the formation.

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- ~~16~~ ~~17~~. The method of Claim ~~16~~<sup>15</sup> wherein said fracturing fluid comprises at least one counterion selected from the group consisting of organic acids and organic salts.
- ~~17~~ ~~18~~. The method of Claim ~~16~~<sup>15</sup> wherein said counter ion is selected from the group consisting of sulfates, sulfonates and salicylates.
- ~~18~~ ~~19~~. The method of Claim ~~17~~<sup>15</sup> wherein said counterion comprises at least one aromatic group.
- ~~19~~ ~~20~~. The method of Claim ~~17~~<sup>16</sup> wherein said counterion is an aromatic sulfonate.
- ~~20~~ ~~21~~. The method of Claim ~~16~~<sup>15</sup> wherein said gel has a thermal stability up to temperatures of about 110° C.
- ~~21~~ ~~22~~. The method of Claim ~~16~~<sup>15</sup> wherein said fracturing fluid has thermal stability of

greater than about 90° C.

- ~~22~~ ~~23~~. The method of Claim ~~16~~<sup>15</sup> wherein said fracturing fluid comprises from about 0.05% to about 10% by weight of said cationic surfactant.
- ~~23~~ ~~24~~. A method of suspending particles in a thickened aqueous liquid the method comprising the steps of:
- I) providing an aqueous medium; and
  - II) adding to said aqueous medium, an effective amount of at least one surfactant and at least one counterion selected from the group consisting of organic salts, inorganic salts, organic acids, alcohols, and mixtures thereof, sufficient to increase the viscosity of said aqueous medium wherein said surfactant has the following having the following general structure:



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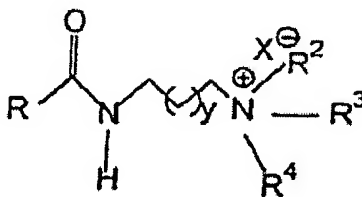
wherein  $R^1$  is alkylamine alkene or alkyl amidoalkene,  $R^2$  and  $R^3$  are each alkyl, hydroxy alkyl, alkyl, hydroxy alkyl, polyalkoxy with the degree of polymerization ranging from 2 to 30, hydroxyl alkyl sulfonate, alkyl sulfonate or alkylarylsulfonate;  $R^4$  is hydrocarbon, saturated or unsaturated; or wherein any two of  $R^2$ ,  $R^3$  and  $R^4$ , together with the nitrogen atom to which they are attached, form a heterocyclic ring; and X is selected from the group consisting of halides; oxo ions of phosphorous, sulfur or chloride; and organic anions.

wherein said aqueous liquid is sufficiently thickened to suspend solid particulate matter.

- 24<sup>25</sup>. The method of Claim <sup>23</sup>~~24~~ further comprising transporting the suspension of said solid particulate matter in said aqueous liquid to a remote location.
- <sup>23</sup>~~26~~<sup>25</sup>. The method of Claim <sup>23</sup>~~24~~ wherein said solid particulate matter is selected from the group consisting of cuttings and proppants.

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- ~~26~~ <sup>27</sup> 27. The method of Claim ~~24~~ <sup>23</sup> wherein said method is implemented in a well drilling operation.
- ~~27~~ <sup>28</sup> 28. The method of Claim ~~24~~ <sup>23</sup> wherein said method is implemented in a coil-tubing operation.
- ~~28~~ <sup>29</sup> 29. The method of Claim ~~24~~ <sup>23</sup> wherein said method is implemented in a construction operation.
- ~~29~~ <sup>30</sup> 30. The method of Claim ~~24~~ <sup>23</sup> wherein said method is implemented in a mining operations.
- ~~30~~ <sup>31</sup> 31. A method of reducing the friction exhibited by an aqueous liquid during flow through a conduit comprising the steps of:
- providing an aqueous medium;
  - contacting said aqueous medium with a friction reducing amount of a viscoelastic surfactant having the following general structure:



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wherein R is saturated or unsaturated alkyl and y is an integer from 1 to 12, and an additive selected from the group consisting of inorganic salts, organic salts, organic acids, alcohols, and mixtures thereof; and

c) passing said aqueous fluid through said conduit;

wherein said viscoelastic surfactant and said additive are present in an amount capable of reducing the friction exhibited by said aqueous liquid as said aqueous liquid passes through said conduit.

~~32 An oil field high brine completion fluid comprising.~~

~~a) about 30 wt-% to about 70 wt-% of at least one inorganic or organic salt; and~~

~~b) about 0.1 wt-% to about 4 wt-% of at least one cationic surfactant having the following general structure:~~